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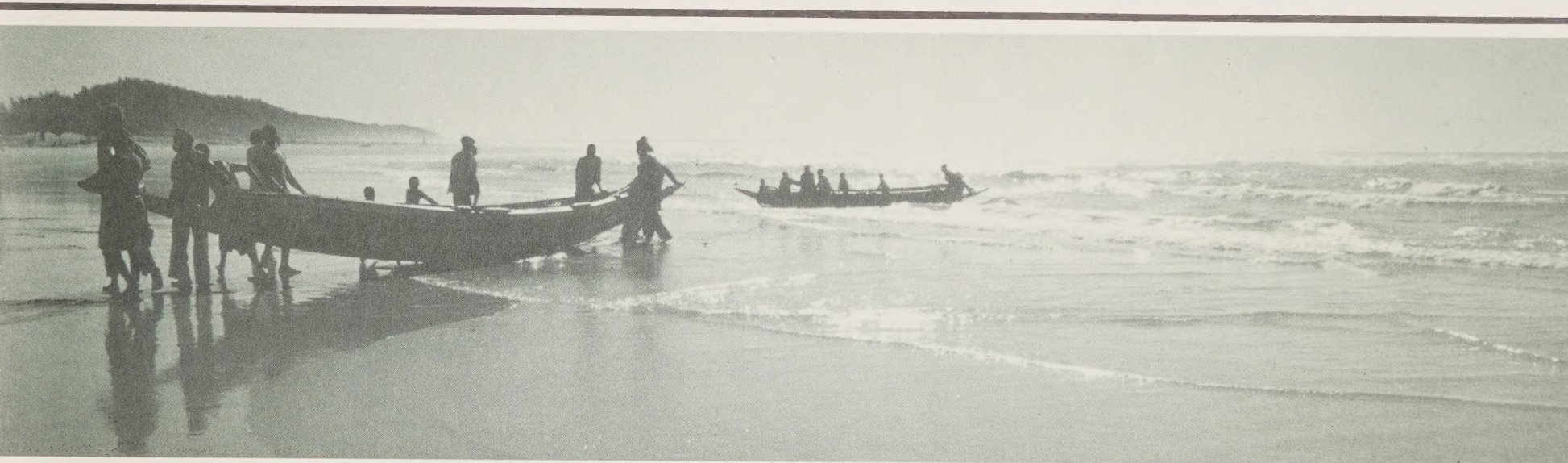
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Canada and World Fisheries

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Canada and World Fisheries



Protein is the building block of life, and millions of people throughout the world depend on fish as the primary source of this essential raw material in their daily diet. That dependency, in an increasingly crowded and protein-hungry world, has grown to the point where, in Asia alone, more than a billion people now depend on fish for the maintenance of life and health.

The United Nations Food and Agriculture Organization (FAO) estimates a growth of 3.5 per cent in the annual demand for fish between 1980 and 1985; the annual growth in supply has ranged from 1 to 2 per cent.

Canada, as one of the world's principal fishing nations — and currently the leading exporter in terms of value — works at home to achieve an efficient exploitation of its own resources; abroad, it will continue to assist the developing nations to make better use of their fisheries resources.

The Canadian Experience

While it was fish that first lured the Europeans to its shores, Canada has been a fishing nation for much longer than the recent 400-year period of European immigration and settlement. Bounded by three oceans, and blessed with thousands of freshwater lakes and rivers, the country has always been rich in fisheries resources. Its waters gave prosperity to those who lived here for thousands of years before the European influx. Even today, native people continue to exploit the fisheries as an essential part of their livelihood.

Today, fisheries is a multi-million-dollar industry that employs more than 100,000 Canadians, either as fishermen or as processing-industry employees; thousands more depend on the fisheries for their livelihood, including those employed in vessel design and construction, equipment manufacture and supply, and wholesale and retail operations.

Most of Canada's fish harvest is seasonal, by a fleet of some 43,000 vessels, the great majority independently owned. All told, Canada has some 900 processing plants of varying sizes and capabilities which produce fish in a wide variety of product forms.

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Hauling in a lobster trap off Prince Edward Island. Most of Canada's fish harvest is seasonal, by a fleet of some 43,000 vessels.

Canada, as one of the world's principal fishing nations — and currently the leading exporter in terms of value — works at home to achieve an efficient exploitation of its own resources

◀ CIDA Photo: Dilip Mehta
A fisherman in India casts his net in a manner that has not changed since ancient times. In the developing world, the task of providing fish for the family or local market falls on low-income fishermen who have little if any mechanized gear.

*Sound scientific information is
the backbone of fisheries
management*



Canada's Department of Fisheries and Oceans has achieved an international reputation in fisheries research.

The clean cold waters of Canada's inland and coastal areas yield many species of commercially important fish and shellfish. Canadian cod, salmon, herring, lobster, crab and scallops are among the best sellers abroad. Indeed, Canada currently exports more fish and seafood in dollar value than any other nation. In 1983, Canada's fishery product exports reached \$1.6 billion.

The year 1977 was a critical one for Canada and many other coastal states. It saw the establishment of the 200-mile (320-kilometre) fishing zone. This gave coastal states the opportunity to manage their marine resources, which in some cases had been seriously depleted.

The rebuilding of overfished stocks was Canada's first priority. In many cases, this meant setting strictly enforced limits on catches so that stocks would prosper and provide a long-term basis for a source of food and a viable industry.

The results of careful resource management have been dramatic. Depleted stocks of fish have for the most part recovered, and as the populations increase so do the catch limits. Landings of groundfish have increased by 56 per cent since 1977, and in the case of some stocks have more than doubled.

Responsibility for fisheries management in Canada rests with the federal government's Department of Fisheries and Oceans (DFO), an organization with roots formed more than 100 years ago. It administers programs in all regions of Canada to ensure the conservation, protection and expansion of fisheries resources. It also assists fishermen technically to achieve more efficient harvesting; it advises on the upgrading of existing fish products and the development of new ones; and it disseminates information on markets and marketing techniques.

DFO has also achieved an international reputation in fisheries research, for sound scientific information is the backbone of fisheries management. From 12 federally-owned research centres located in key areas on the coast or inland, some 500 biologists and oceanographers work to collect and analyze data that has a direct bearing on fisheries both in Canada and abroad.

The range of scientific endeavour is extremely broad, covering everything from ecology and population dynamics to predator relationships and aquaculture. The impact of overfishing, however lethal, is only part of the pressure put on fish stocks. Fish vie with fish, competing for food supplies, in some cases providing food for each other. Canadian scientists are investigating the interactions and interdependence of fish stocks. They are also heavily engaged in

studies of fish habitat — the areas in which fish breed, rear and live, and whose destruction by pollution and general industrial headlessness represents as dangerous a threat as overfishing ever did.

One of the very practical scientific tasks, of course, is the forecasting of stock abundance since this has a direct bearing on the number of fish that fishermen will be allowed to catch in a given season, and Canadian scientists regularly monitor some 80 stocks. Economists and sociologists also work to develop strategies for the people and communities that have depended for generations on this single resource.

Fisheries science is marked by a close degree of international cooperation in which Canada is prominently involved. The nation is represented on a dozen international fisheries bodies (including the Northwest Atlantic Fisheries Organization, the International Council for Exploration of the Sea, the International Commission for the Conservation of Atlantic Tunas, and the International North Pacific Fisheries Commission).

World Fisheries

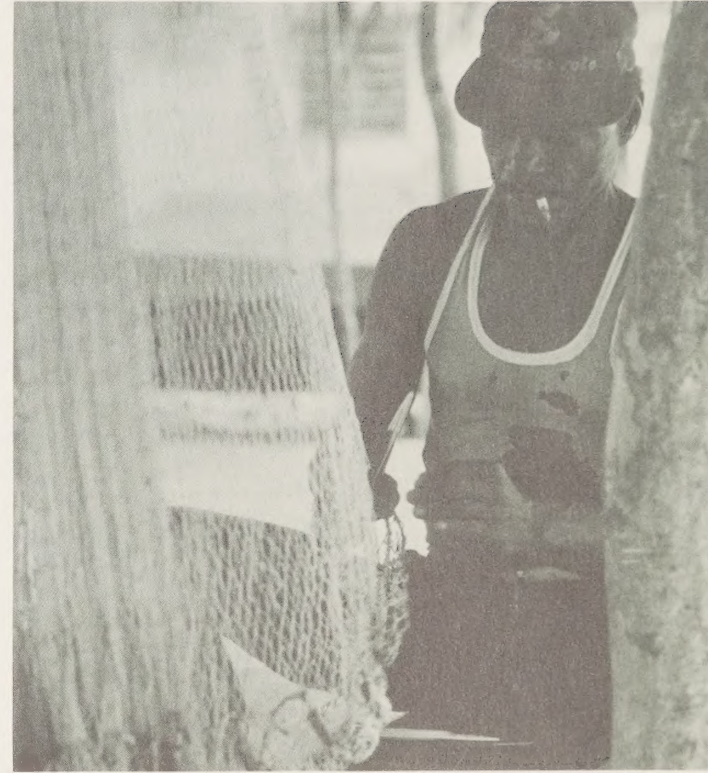
The world fish catch is now in the neighbourhood of 70 million tonnes annually. While 60 per cent is eaten by people in developing countries, for many of these, the per capita fish consumption is still below the world average. Moreover, some 27 per cent of the total catch is reduced to fish meal for consumption by livestock, and to fish oil and other by-products.

A significant proportion of the world's fish is now caught from large factory trawlers that travel long distances from home, exploiting mainly the deep seas and processing fish on board. Such highly mechanized, capital-intensive operations supply most of the canned and frozen fish of the world, as well as fish meal and oil.

While a number of developing countries have acquired this form of technology, most fishing economies in the Third World continue to depend on the work of the artisanal fisherman. The small-scale, independent fishermen of some countries supply *all* fish purchased within their borders; the markets of most others obtain fully three-quarters of their supply from such fishermen.

When the cost of labour and energy is computed, it is clear that the production costs of the small-scale fisherman, who may well supplement his small income with a little farming, are relatively

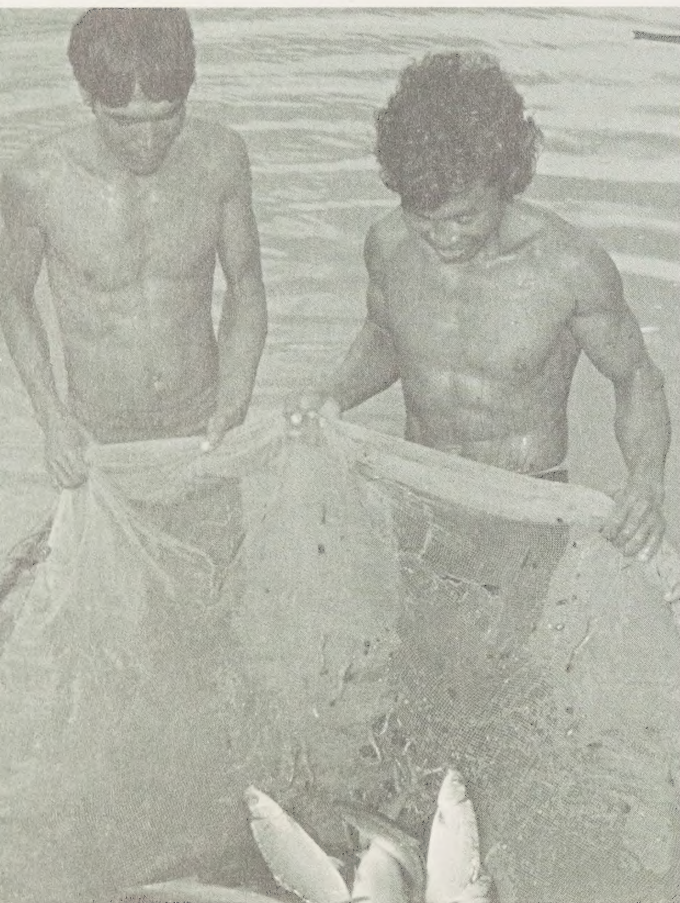
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CIDA Photo: Pat Morrow

A Colombian fisherman mends his nets. Small-scale fisheries, which predominate in most developing countries, are more labour-intensive than large-scale operations yet can be just as economical and efficient.

*Most fishing economies in the
Third World continue to depend
on the work of the artisanal
fisherman*



IDRC Photo

Harvesting the milkfish crop in experimental ponds in the Philippines. A bounty of protein, milkfish are the preferred fish of Filipino consumers.

*Many of the developing countries
have very old and quite efficient
techniques of aquaculture*

low. Studies show that a small boat with little mechanized gear and only primitive storage and processing facilities, produces each calorie of food by using only one-fifth the fuel consumed by the deep-sea vessels for such output. Here, then, lies the real potential for energy-conscious expansion of the world's fisheries. Support of the small-scale fisheries also harmonizes well with Canada's overall development strategy, which emphasizes aid to the poorest groups in the poorest countries.

Many of the developing nations, as well as offering a case study in the area of energy conservation, also have very old and quite efficient techniques of aquaculture. This is the controlled culture, breeding and rearing of aquatic species for subsistence or commercial purposes in areas that would otherwise be idle, or where fish breeding complements rice or livestock production.

There are several million fish farmers in South and Southeast Asia, each managing a small pond that usually covers no more than one hectare in area. In Indonesia, the Philippines and Taiwan, well over one million hectares of brackish-water pond are dedicated to the rearing of milkfish, which form the basis of a multi-million dollar industry. Aquaculture represents not only one of the successes of the past in some developing countries, but also has the potential for considerably increased production of fish protein.

Canada and the World

FAO has identified some of the most urgent requirements of developing countries, those in which assistance would enable them to narrow the gap between the current level of supplies and the growing nutritional needs of their people. These include: fisheries management, the development of small-scale fisheries and the development of aquaculture.

Canada will continue to assist Third World countries in the exploitation of their fisheries resources. The channels for Canadian aid, both past and present, are bilateral (through agreements between governments), multilateral (through such institutions as UN specialized agencies, the International Fund for Agricultural Development, the World Bank and the regional development banks), Canadian and international non-governmental organizations (NGOs), the efforts of Canada's provincial governments, and Canadian and international research centres.

The Canadian International Development Agency (CIDA) is the government body responsible for administering Canadian assistance to developing countries. It is assisted in its efforts by the Department of Fisheries and Oceans, which supplies technical support and expertise for CIDA's fisheries work overseas.

Bilateral Assistance

The bilateral channel represents the most evident form of assistance, at least in terms of direct funding, with CIDA sponsoring some 30 ongoing projects in the fisheries sector in 1984. A few of them are regional projects, while the others affect 16 separate countries in Africa, Asia, Latin America and the Caribbean. Total disbursements by the time these projects are fully implemented will be approximately \$80 million, with expenditures ranging from a \$12-million scheme to restructure Senegalese fish marketing to a \$35,000 marine resource survey in the Caribbean.

The Multilateral Channel

Canadian assistance through the multilateral channel may be less visible but is nonetheless significant. Canada provides funding, along with other donors, to international organizations and financial institutions, which in turn support development activities.

For example, Canada makes annual aid disbursements to the United Nations Development Programme (UNDP) (\$61 million in 1983-84), which funds technical cooperation projects. The UNDP spends about \$40 million yearly on fisheries. The projects are designed by recipient governments themselves and usually implemented by other UN specialized agencies (mainly the FAO in this case). The primary focus is to foster self-reliance through human resources devel-

opment as well as building up research and management capacity.

Another organization that receives Canadian funding is the International Fund for Agricultural Development (IFAD). Canada's contribution in 1983-84 was \$14 million and IFAD has spent a total of \$55 million on fisheries projects since it began operations in 1977. It emphasizes development of small-scale fisheries with a view to building up the recipients' self-reliance.

International financial institutions, which receive capital subscriptions and advances from member countries, also play a role in financing fisheries development projects. Canada supports the World Bank, the African Development Bank, the Asian Development Bank, the Caribbean Development Bank, and the Interamerican Development Bank. Total Canadian subscriptions, advances and grants last year amounted to \$335 million collectively, with the largest share going to the International Development Association (the soft loan window of the World Bank).

Total World Bank loans in support of fisheries projects amounted to \$ U.S. 292.5 million by mid 1983. Recent projects have emphasized the strengthening of fisheries infrastructure.

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Through the multilateral channel, Canada is funding projects managed by the FAO to develop artisanal fisheries in Indonesia, Malaysia, the Philippines and Thailand



CIDA Photo: Paul Chiasson

The fish market in Kisumu, Kenya. The FAO is concerned about the ability of fishermen to meet the growing world demand for fish.

Fisheries science is marked by a close degree of international cooperation in which Canada is prominently involved



Canadian fishery officers inspect mesh size aboard a French factory trawler.

Non-Governmental Organizations

Not all Canadian aid comes from the government, however. The non-governmental organizations, both Canadian and international, play an important role in supporting the local initiatives of small-scale fishermen. They provide grants and technical assistance to help them improve their equipment and procedures with a view to greater catches, better quality, efficient processing and more successful marketing.

Organizations like the Boy Scouts of Canada, Care Canada, the Unitarian Service Committee of Canada, Oxfam Canada, The Canadian University Services Overseas (CUSO), cooperative groups, the universities and the churches are engaged in the support of a variety of small projects throughout the Third World, from Bangladesh to Belize. All told, some 25 NGOs and institutions are involved in about 46 projects worth around \$7.6 million and affecting some 28 countries. CIDA offers matching grants to these organizations and is responsible for in the order of 58 per cent of the funding.

For its part, CIDA's Industrial Cooperation Program is helping Canadian firms to establish joint ventures with businesses in developing countries and to adapt Canadian technology to the needs of the Third World. The program currently encompasses 14 fishery projects worth \$1.2 million in eight countries and the Southeast Asia region. They include feasibility and starter studies of joint ventures pertaining to fishing, fish farming, boat building, fish marketing and distribution.

As well, Canada directly supports two major independent non-governmental research organizations that provide international assistance. The activity of the International Development Research Centre (IDRC), a public corporation created by the Parliament of Canada in 1970, is concentrated in five sectors: agriculture, food and nutrition sciences; health sciences; information sciences; social sciences; and communications. In fiscal year 1983-84, IDRC appropriations for fisheries projects amounted to \$2.5 million.

The Centre is financed solely by the Parliament of Canada, but its policies are set by an international Board of Governors. It has its headquarters in Ottawa and regional offices in Kenya, Senegal, Singapore, Colombia, and Egypt.

A revolution in aquaculture recently occurred in Southeast Asia as a result of cooperation between IDRC, DFO and the Southeast Asian Fish Development Centre. Coastal communities in many countries of Southeast Asia have cultured milkfish since ancient times. In fact, a primitive method of trapping the fry in bays and inlets is still widely practised; the fry are then simply held in captivity and fed until they are big enough to market. In some areas, the technology of milkfish farming was sophisticated enough to have made this a highly profitable industry. Nevertheless, production was limited by the fact that milkfish did not spawn in captivity. Recently, however, successful induced breeding of milkfish was accomplished by researchers including scientists from the Vancouver laboratory of DFO. Milkfish farming has since increased in value and production.

Another Canadian initiative was the creation of the International Centre for Ocean Development (ICOD). An independent non-governmental body situated in Halifax, Nova Scotia, this organization — like IDRC — is governed by an international Board of Governors representing various countries and regions.

Its aim is to help the Third World to achieve an optimal return on its fisheries assets. In practical terms, it means that the Centre will provide training, advice, information and research assistance with an expenditure of \$23 million over the next five-year period.

ICOD will draw on all Canadian expertise and facilities as well as make use of international know-how and institutions, including those of developing countries, where appropriate. Thus, the Centre will function as the nucleus of a network connecting the academic and technological resources of Canada and other countries.

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CIDA Photo: Michel Faugere

Unloading the catch from Senegalese boats. Canada is assisting Senegal to implement an improved management, packaging, storage and distribution system.

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Fisheries Management

Canada's successful experience in fisheries management should be regarded as an international resource. Its expertise is at the disposal of those developing countries which, like Canada, have recently acquired jurisdiction over oceans within 200 miles of their shores.

For the nations affected, this has meant new opportunities to control and strengthen their fisheries industry.

Many of the coastal states are developing countries, however, lacking the educational, physical and financial resources to exploit their new ocean territories in the most efficient and creative way. These countries do not have complete and accurate profiles of their marine resources, nor do they have the knowledge of biology or oceanography, for example, that are basic to a sound resource management program. The result has tended to be overfishing and a decline in stocks. Equally pernicious is the effect of human and radioactive wastes, oil slicks, chemical wastes, pesticides and detergents that wreak havoc on all types of marine species.

A notable example of Canadian assistance in the field of fisheries management occurred in 1976. At the request of the *Instituto del Mar del Peru* and the Peruvian Ministry of Fisheries, CIDA provided a grant for research on the anchovy and its environment. Working

in cooperation with Peruvian scientists, the Canadian research team (drawn from Dalhousie University and the Department of Fisheries and Oceans at the Bedford Institute of Oceanography in Nova Scotia) was able to gather enough information to provide the Peruvian fisheries authorities with invaluable new insights into factors governing the abundance of the anchovy stock. A capacity to interpret and predict changes in the anchovy population is now making it easier for Peru to preserve the species while at the same time maximizing its exploitation.

Information is one key to good management; another is effective control. Since 1981, CIDA has been training the Senegalese in methods of patrol and surveillance. This involves the overseeing of both Senegalese and foreign fleets within Senegal's 200-mile economic zone and combines administrative, scientific and operational facets.



CIDA Photo: Michel Faugere

Putting out to sea from the port at Dakar, Senegal. Blessed with extensive fisheries resources, Senegal is one of the developing countries moving into industrial fishing.

Small-Scale Fisheries

It follows from Canada's determination to direct its development dollars to the poorest communities of the developing world that small-scale fisheries will be among the chief beneficiaries. Also, here there is a great potential for expansion. Through the development of an infrastructure to enhance fishing, processing, distribution and marketing, and through training of personnel at every step of the way, it should be possible both to increase food supplies generally and to improve the incomes of everyone involved in the fisheries. Thus, human and economic benefits accrue to the community at large.

Infrastructure

Fish processing demands proper facilities: systems for unloading fish; processing, refrigeration and freezing plants; packaging equipment and materials; mechanical presses; canning machines; driers and control equipment. Canada's proven expertise in fish processing technology, as in distribution and marketing, has been shown to be effective in development work.

In Southeast Asia, where fish accounts for 40 to 60 per cent of the population's intake of animal protein, CIDA has been helping the Association of Southeast Asian Nations (ASEAN) to reduce post-harvest losses by improving quality control and inspection systems. Unloading

and processing facilities, refrigeration and cold storage, packaging systems and other shore infrastructure are all being upgraded. As a result, formerly under-utilized species are being turned into new, marketable fish products, and previously existing products are being improved.

Since 1971, CIDA has also been helping Senegal's Centre for Assistance to Small-Scale Fishing in its project to improve the quality, packaging and distribution of fisheries products. Canadian help has included the construction of an administrative centre and eight fish-processing plants, the provision of technical assistance and the training of Senegalese managers and technicians.

CIDA has also assisted the government of St. Lucia in preparing a long-term fisheries development plan. A fish landing and processing complex has been constructed there, completely fitted out with vehicles, fish-landing docks for canoes, cold storage facilities, ice-making equipment, a complete processing system and a marketing area.

In Zambia, CIDA has been involved since 1981 in a project which will eventually link fisheries in lakes Tanganyika, Mweru, and Mweru-Wan-Tipa to important purchasing centres. Small-scale fishermen who have been unable to get their fish to market will benefit from the construction of 570 kilometres of all-sea-

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In Zambia, CIDA has been involved since 1981 in a project that will eventually link fisheries in lakes Tanganyika, Mweru and Mweru-Wan-Tipa to important purchasing centres.



CIDA Photo: Neville Bell

Zambians are working to open up their northern provinces by constructing all-season roads with assistance from Canada. Fishermen who fish in northern lakes will then find it easier to market their catch.



CIDA Photo: Dilip Mehta

One of the Canadians participating in fisheries development in St. Lucia surveys the catch of members of the St. Lucia Fishermen's Cooperative Society.

son dirt feeder roads which will also open the northern provinces to further agricultural development.

The Cooperative Development Foundation (CDF) is a Canadian NGO which has also worked in Zambia, assisting the Luapula Fisheries Cooperative to establish markets in the Copperbelt, Zambia's urban-industrial heartland. The feeder roads referred to above will assist them to take advantage of these markets.

The CDF is active in other countries, also. For example, in Botswana it is working with the Canadian University Service Overseas (CUSO), another NGO, to help the Yambezi Multipurpose Cooperative Society to identify markets, establish infrastructural requirements, improve techniques of fishing and preserving the catch, educate members about depletion of fish stocks and strengthen the cooperative's organization.

Multilaterally, Canada is funding projects managed by the FAO to develop artisanal fisheries in Indonesia, Malaysia, the Philippines and Thailand. These projects involve resource surveys, formulation of demonstration projects and the provision of fishing materials.

Training

Qualified workers are needed at all levels in the fisheries sector: fishermen and workers who know the techniques of catching, processing and preserving fish; extension staff to train them in these techniques; and administrators, economists, scientists and professionals with appropriate academic training to plan and manage.

Canadians with experience in all these areas carry technical assistance to the field while Canadian institutions provide training to people coming to Canada from developing countries to upgrade their skills.

Often, training is only one element — a vital one — of some much larger project. In Thailand, for example, Canadian fisheries experts and equipment were sent to participate in an aquaculture program; at the same time, Thai nationals came to Canada for training. These students have now returned home and are working at some 20 inland fishing stations, where they are able in turn to impart new expertise to colleagues and employees.

In Senegal, between 1972 and 1978, managers, warehousemen and some 30 mechanics were trained by Canadian technicians in aspects of the motorization of fishing boats. These people now run a centre where fishermen are trained in ongoing preventive maintenance

of boat engines, and the fishery as a result has become much more productive.

St. Lucian nationals involved in the CIDA-sponsored fisheries development project recently came to Canada for training. At the same time, CIDA will send marketing specialists, a plant manager and other skilled personnel to work in St. Lucia.

Also in St. Lucia, the CDF and CUSO are cooperating to work with students from throughout the Windward Islands. They are using the facilities of the Goodwill Fishermen's Cooperative to train mechanics in the maintenance of outboard and inboard engines. Graduate trainees will scatter throughout the islands to various fishing cooperatives.

Finally, the government of Nova Scotia has been assisting Belize fishermen since 1978 to upgrade their knowledge of navigation, deep-sea fishing techniques, engine repair and net-mending, by receiving them at the Fisheries Training Centre in Pictou, Nova Scotia. Canadian instructors have also been providing field training in Belize. The Canadian government cooperates with the provincial government in this endeavour by defraying the travel expenses of fishermen through the Voluntary Agricultural Development program.

Aquaculture

Fishing is usually a kind of hunting. Thus, fishermen are hunters ranging in search of a catch, and competition is often intense on the open seas. One means of reducing such competition is to transform at least part of the fisheries into a farming, rather than a hunting, activity. Such an approach would also enable inland nations to enhance their indigenous fisheries.

CIDA gave a grant to Thailand's National Inland Fisheries Institute, which was created in 1975 to manage Thai fisheries and to increase fish production. A number of avenues have been explored to this end, including aquaculture. Canadian funds were used to build a headquarters for the Institute, where laboratories and offices are now housed. The grant also provided personnel training, as mentioned.

In Bangladesh a fast-spreading self-help movement called Proshika is creating new opportunities for thousands of impoverished people. Proshika workers, enthusiastic young Bangladeshi, have begun to teach fish culture to villagers as a means of improving their standard of living and providing a good, cheap source of protein. The villagers excavate pools, fill them with clean water and stock them with fish. The movement was supported in its infancy by CUSO, and later by CIDA.

Aquaculture represents not only one of the successes of the past in some developing countries, but also has the potential for considerably increased production of fish protein



CIDA Photo K. Dombi

Fish farming in Toda, Colombia. Aquaculture has been practised with success in many developing countries, and has great potential for expansion.



CIDA Photo: Crombie McNeill

Looking over the day's catch on a Jamaican beach.

The FAO estimates world catches will increase by 20 to 30 million tonnes over the next two decades. That isn't enough. It represents an annual growth in supply of 1 to 2 per cent; the demand — mostly in the developing world where the population is increasing more rapidly — is expected to exceed 3 per cent annually.

Canada, as a major force in world fisheries, will continue to assist in increasing the world supply of fish — either by helping other nations to develop their fisheries or, for those countries with acute shortages, through food aid. Canada sends donations of saltfish and canned fish that in 1983-84 reached a value of \$24.6 million — more than three times the amount sent during the previous year. Fish represents 7.3 per cent of Canada's total food aid budget of \$336 million, and 35 per cent of fish food aid that has come from OECD-member countries in recent years. The Canadian government is seeking ways to increase the amount of fish sent abroad in the form of food aid.

Good management, according to the FAO, may account for as much as 50 per cent of the projected increase in catches over the next 20 years, which puts a heavy onus on fishermen, scientists, planners and technicians to ensure that the assets of the sea are carefully husbanded and well managed.

Canada's intention is to continue to work both at home and abroad to meet — through its fisheries — the challenge of world-wide protein shortages. Sound resource management must be encouraged in order to maintain or restore yields and to ensure the permanence of stocks. Fish-handling, marketing and distribution must be improved so that there are fewer losses of fish between harvest and consumption. Species which for one reason or another have not been adequately exploited must play a larger part in world supply. Aquaculture must be developed as a means of increasing significantly the harvest of fish, particularly in areas of food shortage.

This is the challenge: through coordinated international action to use fisheries development to assist in eradicating the world's food shortage by the year 2000. Canada will continue to play its part.

Filleting fish. Canada has some 900 processing plants which produce fish in a wide variety of product forms. ►





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